

## ATTORNEY DOCKET: PD-02W150

## PATENT

REMARKS

This responds to the Office Action dated on May 3, 2006, and the references cited therewith. Reconsideration is respectfully requested.

Claims 1, 3, 7, 8, 12, 14, 20 and 21 are amended, Claim 23 is canceled, and no claims are added; as a result, Claims 1 – 10 and 12 – 22 are now pending in this application.

§103 Rejection of the Claims

Claims 1-10, 12-18, and 20-23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Jiang (EP 0907237) and Giannopoulos (U.S. Patent No. 6,504,267).

Applicant's Claim 1, for example, is directed to a power converter. The power converter includes a shared first-side stage to receive an input, and a plurality of second-side converter stages coupled to the first-side stage wherein each of the second-side converter stages that each generate an output. The power converter also includes control circuitry to separately monitor the outputs of the second-side converter stages and generate a control signal for each output. The control signal turns off switching elements of a corresponding one of the second-side converter stage to regulate the output. As further recited in Claim 1, steering circuitry *couples* switching elements of the first-side stage to switching elements of the second side converter stages. The steering circuitry *allows current to flow* from the switching elements of the first-side stage to the switching elements of the second-side converter stages. The steering circuitry also inhibits current from flowing between the switching elements of the second-side converter stages when a switching element of one of the second-side converter stages is turned off before a switching element of one of the other second-side converter stage.

Applicant submits that these elements is not taught, suggested or motivated by the cited references, either separately or in combination. For example, Applicant's Claim 1 recites steering circuitry that *couples switching elements of the first-side stage to switching elements of the second side converter stages*. The Examiner states that diodes D1 – D4 in Giannopoulos correspond to Applicant's steering circuitry; however diodes D1 – D4 in Giannopoulos are do not couple anything from the primary side to the secondary side of the power converter. In Giannopoulos, diodes D1 – D4 couple secondary windings 516 of the transformer to switches S1

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– S4 respectively (see Giannopoulos FIG. 5). Diodes D1 – D4 *do not couple* switching elements on the primary side to switching elements on the secondary side of the power converter. Accordingly, the combination of Giannopoulos with Jiang cannot result in Applicant's claimed invention.

This coupling between the switching elements of the first side stage and the second side stage is further emphasized in Applicant's Claim 1 which recites that the steering circuitry allows *current to flow from the switching elements of the first-side stage to the switching elements of the second-side converter*. This is not the case in either Giannopoulos or Jiang. In both Giannopoulos and Jiang, the primary and secondary sides of the power converter are isolated by the transformer (see Giannopoulos FIG. 5 and Jiang FIG. 1). In both Giannopoulos and Jiang, no current can flow from switching elements of the primary side to switching elements of the secondary side of the power converter. This further emphasizes that the combination of Giannopoulos and Jiang cannot result in Applicant's claimed invention.

Applicant further submits that there would be no motivation to combine Giannopoulos with Jiang because Giannopoulos uses a single secondary winding 516 to generate multiple outputs, while Jiang uses multiple secondary windings to generate multiple outputs. Because Jiang uses separate windings for each output, and because the secondary sides are isolated, there would be no reason to include diodes D1 – D4 of Giannopoulos to prevent current from flowing back to a secondary winding in Jiang. In Jiang, current could not flow from one output stage to another output stage because the output stages are electrically isolated (see Jiang FIG. 1 which shows output stages 20, 22 and 26 (e.g., FIG. 1) being isolated from input/primary side 12). This is also the case in FIGs. 2 – 4 of Jiang.

Applicant's Claims 3, 12 and 20, as amended, further emphasize the coupling between the primary and secondary sides of the converter. Applicant's Claims 3, 12 and 20 as amended, further recite that each second-side converter stage has a transformer with an input side coupled to the steering circuitry *and* to the switching elements of the second side converter stages. An example of this is illustrated in Applicant's FIG. 2. As illustrated in Applicant's FIG. 2, each second side converter stage (i.e., stage 206 and stage 208) includes a transformer (i.e., transformers 218 and 228). Furthermore, an input side of the transformers are coupled to both steering circuitry (shown as steering diodes 236 and 238 for stage 206 and steering diodes 246

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and 248 for stage 208) and second stage switching elements (i.e., switching elements 214 and 216 for stage 206 and switching elements 224 and 226 for stage 208).

Giannopoulos, on the other hand, does not teach, suggest or motivate the use of more than one transformer for generating more than one output. In Giannopoulos, a single transformer is used to generate more than output voltage (see Giannopoulos FIG. 5). Furthermore, diodes D1 – D4 prevent current from flowing back into the secondary winding 516 of the transformer (see Giannopoulos column 4 lines 66 and 67). Applicant's Claims 3, 12 or 20, on the other hand, recite that the steering circuitry is coupled to *the input side* of the transformers and furthermore, that the steering circuitry couples first side switching elements with second side switching elements. This is not the case in Giannopoulos in which diodes D1 – D4 do not couple to anything on the primary side of the transformer. Therefore, combining Giannopoulos does not result in Applicant's invention as recited in Claims 1, 3, 12 or 20.

Applicant's Claims 7 and 12 further recite that the steering circuitry comprises first and second steering diodes. As recited in Claim 7, the first steering diode inhibits current from flowing from the first to the second second-side stage when a third switching element is turned off before a fifth switching element and while a first switching element is conducting. The second steering diode inhibits current from flowing from the second to the first second-side stage when the fifth switching element is turned off before the third switching element and while the first switching element is conducting. This further emphasizes the operation of the steering circuitry to control current flow between the primary and secondary sides of a power converter, which is not taught, suggested or motivated by either Giannopoulos or Jiang.

Applicant's Claims 8 and 14, for example, further distinguish over the cited references by reciting that freewheeling diodes coupling the input side of each of the transformers to the switching elements of the first-side stage to allow inductive leakage current to flow from the transformers when an associated switching element is turned off. No such coupling is taught by either Giannopoulos or Jiang.

Applicant's Claim 21 has similar recitations to Claim 12 by reciting that steering circuitry inhibits current from flowing between the first low-side stage and one or more other low-side stages when the switching elements of one of the low-side stages is turned off before the other. Applicant's Claim 21 further recites that the steering circuitry allows current to flow through

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from the switching elements of the high-side stage through the steering circuitry to an input side of each of a plurality of transforms to the switching elements of low side stages.

In view of the above, Applicant submits that the rejection of Claims 1 – 10 and 12 – 23 has been overcome and that Claims 1 – 10 and 12 – 22 are in condition for allowance.

Claim 19 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Jiang (EP 0907237) and Giannopoulos (U.S. Patent No. 6,504,267) as applied to Claims 12, 16, and 17 above, and further in view of Harding et al. (2002/0037796). Harding is cited for disclosing optical couplers. In view of the above discussion with respect to Giannopoulos and Jiang, Applicant submits that the combination of Giannopoulos and Jiang with Harding does not result Claim 19 and that Claim 19 is therefore allowable over the cited references.

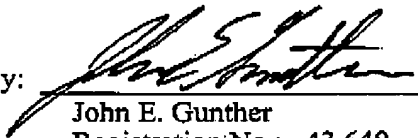
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PATENT****CONCLUSION**

Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney Gregory J. Gorrie at (480) 659-3314 or Applicant's below-named representative at 310-647-3723 to facilitate prosecution of this application.

The Director is hereby authorized to charge the required fee(s), if any, or credit any overpayment to Deposit Account Number 50-0888.

Respectfully submitted,  
John Robert STOWELL, et al.

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